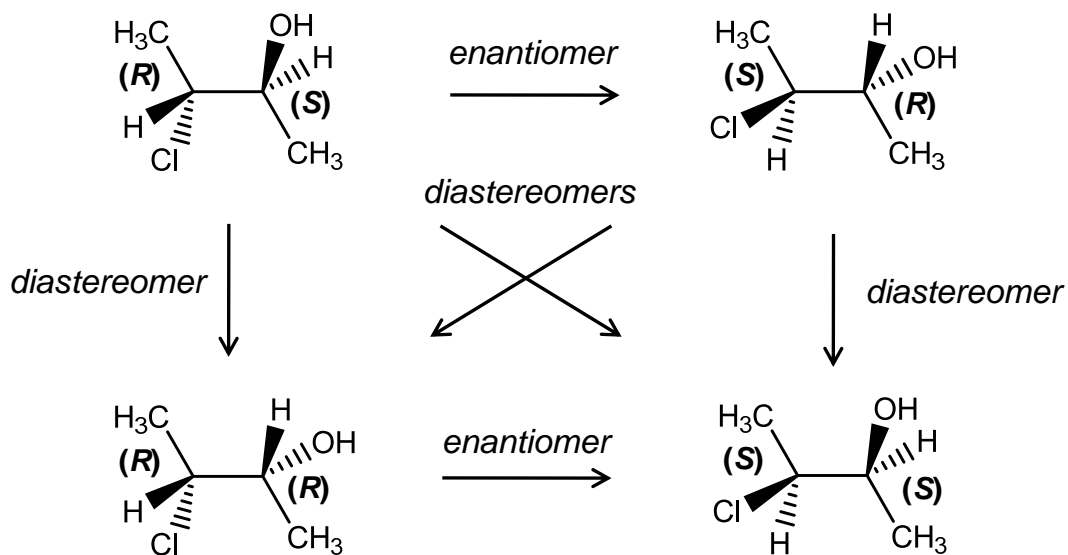


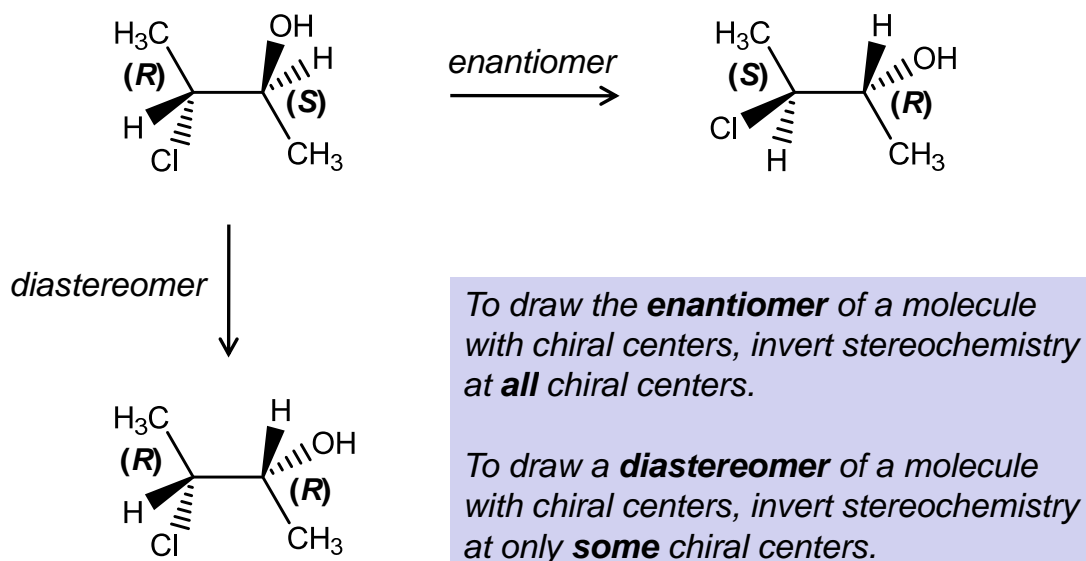
Diastereomers

Diastereomers: Stereoisomers that are not mirror images.



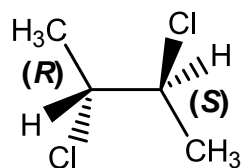
Diastereomers

Diastereomers: Stereoisomers that are not mirror images.



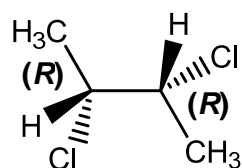
Meso Compounds

Meso: A molecule that contains chiral centers, but is achiral.

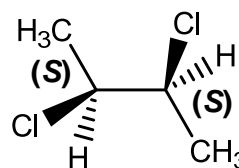


Are these molecules chiral?

(These are different from the molecules I just showed; they have 2 -Cl's, rather than 1 -Cl & 1 -OH.)



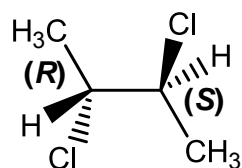
enantiomer



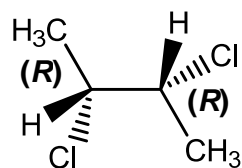
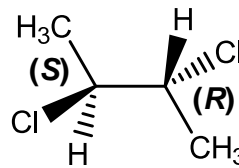
These molecules are **chiral** mirror images of one another. (R,R) and (S,S) are not the same.

Meso Compounds

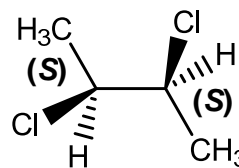
Meso: A molecule that contains chiral centers, but is achiral.



enantiomer ?
no!
same molecule!

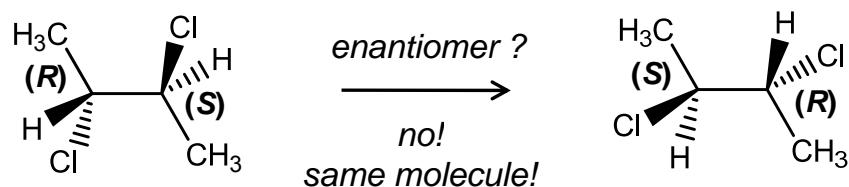


enantiomer



Meso Compounds

Meso: A molecule that contains chiral centers, but is achiral.



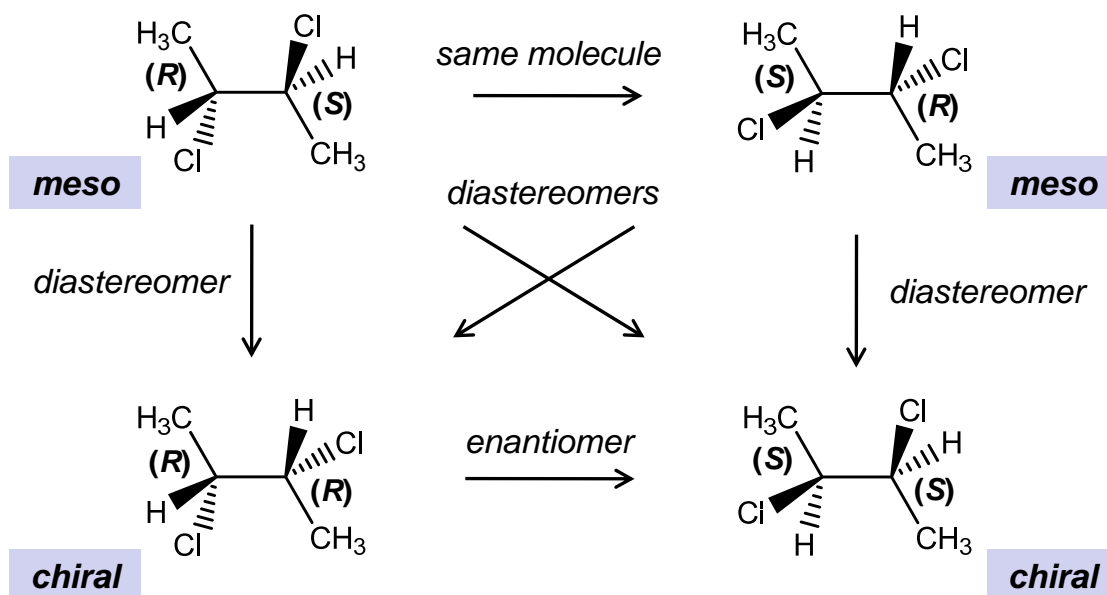
If a molecule

- contains the same number of (*R*) and (*S*) stereocenters, and
- those stereocenters have identical groups attached, then

the molecule is **achiral** and *meso*.

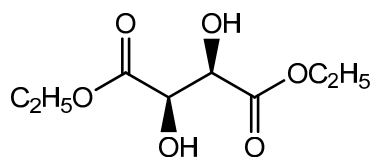
Meso Compounds

Meso: A molecule that contains chiral centers, but is achiral.

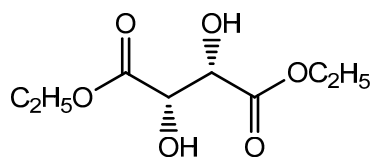


Properties of Enantiomers

Most physical properties of enantiomers are identical.



diethyl-(*R,R*)-tartrate

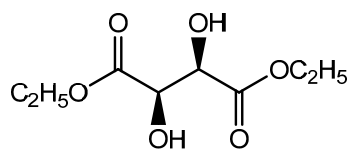
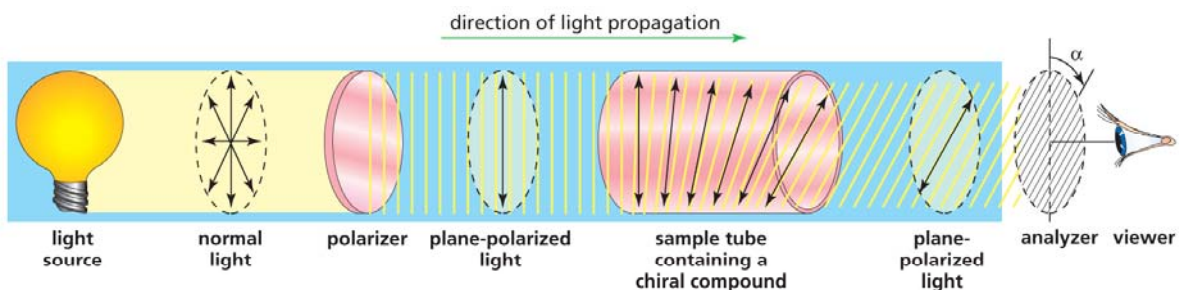


diethyl-(*S,S*)-tartrate

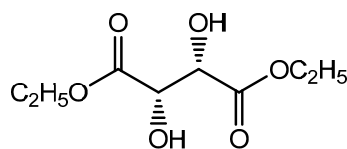
boiling point	280 °C	280 °C
melting point	19 °C	19 °C
density	1.204 g/mL	1.204 g/mL
refractive index	1.447	1.447

i.e., chirality does not affect most physical properties.

Chiral Molecules Rotate Plane-Polarized Light



diethyl-(*R,R*)-tartrate



diethyl-(*S,S*)-tartrate

specific rotation [α]

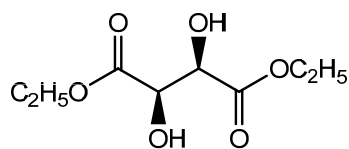
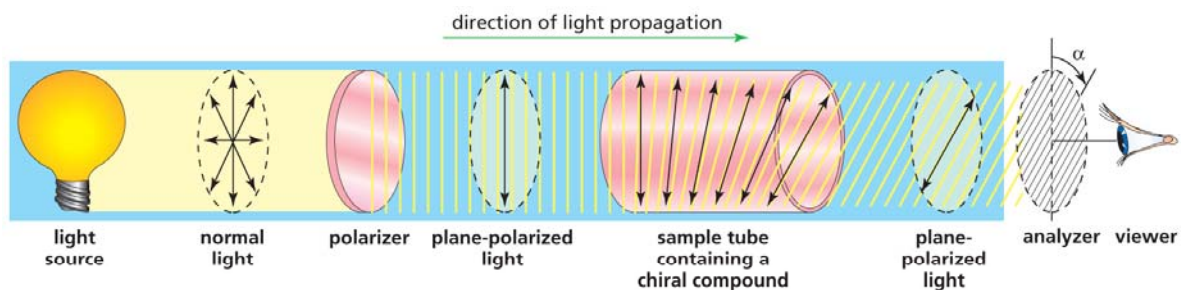
+8.5°

-8.5°

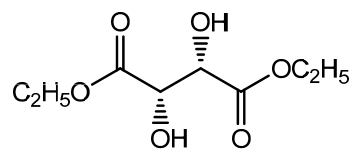
(rotation of light passed through 10 cm of substance; + is clockwise)

enantiomers rotate light in opposite directions.

Chiral Molecules Rotate Plane-Polarized Light



diethyl-(*R,R*)-tartrate



diethyl-(*S,S*)-tartrate

specific rotation [α]

+8.5°

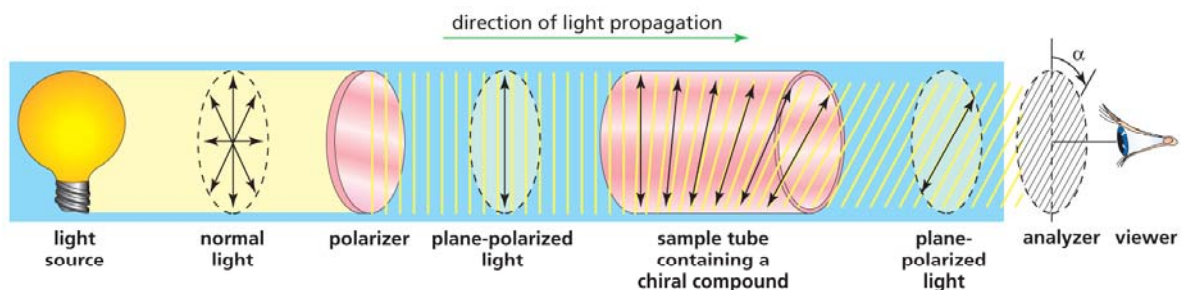
-8.5°

molecules are sometimes named (+) or (-) after this property.

(+)-diethyl tartrate

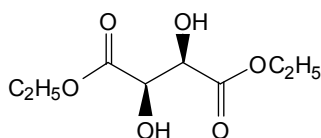
(-)-diethyl tartrate

Chiral Molecules Rotate Plane-Polarized Light



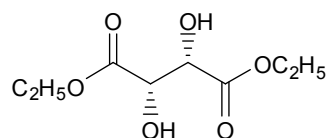
(rotation of light passed through 10 cm of substance; + is clockwise)

specific rotation [α]



diethyl-(*R,R*)-tartrate

+8.5°



diethyl-(*S,S*)-tartrate

-8.5°

molecules are sometimes named (+) or (-) after this property.

(+)-diethyl tartrate

(-)-diethyl tartrate

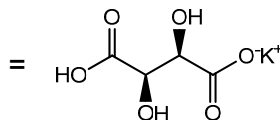
enantiomers rotate light in opposite directions.

Racemic Mixtures

Racemate, or

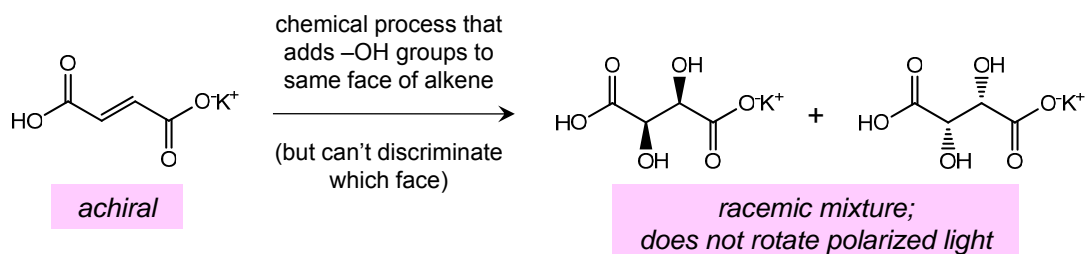
Racemic mixture: A perfect, 1:1 mixture of enantiomers.

- Biological processes normally produce enantiomerically pure materials (are *stereospecific*).

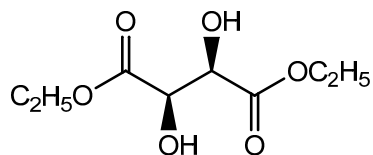


(+)-tartaric acid,
potassium salt

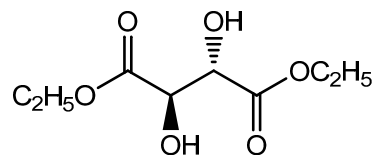
- Chemical processes usually produce racemates.



Diastereomers Have Different Physical Properties



diethyl-(*R,R*)-tartrate



diethyl-(*R,S*)-tartrate

boiling point	280 °C	> 300 °C
melting point	19 °C	60 °C
density	1.204 g/mL	1.135 g/mL
refractive index	1.447	1.432
specific rotation [α]	+8.5°	0°

meso,
achiral